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ABSTRACT

A study was conducted of children's expression of social as well as spatial relations in their placement of dolls. The study was designed to determine how both face contact and physical distance varied according to the social relationship ascribed to the dolls. It was hoped to find out, through this, whether' children's working definitions of front, back, and beside are composed of social as well as purely spatial elements. Ss were 72 boys and 72 girls between 8-10 years. Each S was tested individually by being asked to make a series of "in front," "in back," and "beside" placements of one doll (the mobile doll) in relation to another (the stationary doll). Placements were recorded. Social relationships were manipulated by telling the Ss that the dolls liked each other, disliked each other, or by making no comment (control). Results showed that: (1) closest mean physical distance occurred when the dolls liked each other and farthest when they disliked each other; (2) "in front" placements were farthest," in back" placements were intermediate, and "beside" placements were closest; (3) sex differences were found not as a main effect but in complex interactions with other variables such as the sex combination of the dolls; differences did not follow any consistent pattern; and (4) placements were based primarily on the bodies of the dolls; patterns for different types of placements were analyzed. [Not available in hard copy due to marginal legibility of original document.] (KM)

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Children's Spatial Placements of Dolls Which 'Like' Each Other and of Dolls which 'Dislike' Each Other: Role of Eye Contact and Physical Proximity in 'Personal Space'

Part 1: Physical Proximity Between the Dolls

Part 2: Eye contact in Spatial Placements

Lauren Jay Harris & Ellen A. Strommen

Paper presented at Biennial Meeting of the Society for Research in Child Development, 30 March 1973, Philadelphia, Pennsylvania

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INTRODUCTION

For the last several years, we have been studying children's understanding of the system of spatial coordinates -- in front, in back, and beside. Our procedure is very simple: we ask children to place ordinary objects 'in front of', 'in back of', and 'beside' other objects. We then see what kinds of placements are made, and whether placements change or stay the same when children are asked to place objects which differ in specified ways.

In all of our studies, children's responses have been very consistent, yet at the same time have responded to experimental variables, such as the kind of object placed. For instance, a doll placed 'in front' of another doll is more often placed facing it, while a toy car placed 'in front of' another toy car is more often placed facing in the same direction.

In the case of the dolls, this difference led us to ask whether the 'front' spatial position had been determined by the body or by the face.

We checked this in a study we reported at the last S.R.C.D. meetings, by having children make placements with dolls with moveable heads (the 'Ken' and 'Barbie' dolls). Sometimes the head and body of the dolls were in divergent alignment, sometimes in convergent alignment. The children overwhelmingly used the bodies as the basis for placements. The face served as the basis for placement primarily in situations where such use would be complementary with rather than antagonistic to the use of the body cues.

We expect that the body rather than the face defines the front of a person because heads are mobile relative to bodies. With this intrinsically greater mobility, head movements are relatively far more frequent and unpredictable than body movements. Consequently, if the question is, how does a set of labels come to evolve which describe spatial relations among persons, the frequency and relative

unpredictability of head movements would seem to make the head a poor basis for any consistent labeling system. Had head orientation been the basis for judged spatial position, the numerous and often momentary changes would make the labeling system extremely complex and difficult to learn.

Where the face cues were used in this previous study suggested the children's intention to express a social as well as spatial relation between the dolls. This suggested to us that 'personal space' might be tied in with chidren's understanding of 'front', 'back', and 'beside' as spatial concepts. The concept of 'personal space' refers to how an individual divides up the space immediately surrounding his own body for purposes of social interaction. The area closest to one's own body is the 'zone of privacy'. Ordinarily, an individual maintains this distance from others in social interaction except for those few persons with whom he is intimate.

Beyond this zone of privacy is a second zone in which most social interactions take place.

Finally, there is an outermost zone for formal, public interactions like speeches.

Studies of 'personal space' by researchers such as Little (1965) and Guardo (1969) indicate that the distance placed between members of dyads comprised of representations of human figures is influenced by the degree of friendship, or liking, or acquaintanceship attributed to them. Both children and adults place 'friends' closer than non-friends. These studies, however, have defined social distance strictly as a dimension of physical space. But social distance can be expressed behaviorally through the use of eye contact, or by turning one's back. We wanted to be able to assess both possible expressions of social distance -- face contact and physical distance-- in our subjects' placements of dolls. So we looked to see how both face contact and physical distance varied according to the social

relationship ascribed to the dolls. In this way, we hoped to find out whether children's working definitions of front, back, and beside are composed of social as well as purely spatial elements.

In a sense, our interest in these terms is linguistic as well as spatial and social, since what we're asking the child to do is to 'define', through his actions, what these terms mean. We believe that some of our results agree with recent linguistic analyses of comparative terms.

METHOD

The subjects were 72 boys and 72 girls between 8-10 years.

Each child made a series of 'in front', 'in back', and 'beside' placements of one doll in relation to another doll (the 'Ken' and 'Barbie' dolls). Each doll was attached to a small pedestal which allowed it to stand alone. We'll call the doll placed by the child the 'mobile' doll, and the doll which this mobile doll is placed in relation to, the 'stationary' doll.

Each child was tested individually. The child sat on the floor, and the dolls were placed on a 30-in. diameter poster-board circle. Six concentric rings had been drawn on the circle, each the width of the pedestal of the dolls. The circle was positioned in front of the child. The experimenter sat on a chair slightly behind and to the child's left throughtout the session.

The experimenter brought out the stationary doll and said,"This doll's name is Sue (if, in this case, the stationary doll was a female doll), and I'm going to put her on the board right here. (The doll was placed in the exact center of the circle.) Now here's another doll. His name is Tom. Put Tom in front of (behind, beside) Sue."

We recorded all placements onto a response sheet so designed as to represent the mobile doll's location -- where it was placed -- and its orientation -- how it

was turned relative to the stationary doll, as well as the distance interposed between the mobile doll and the stationary doll.

Figure 1 illustrates the distance scale for the placements together with their equivalents in inches and in real-life distance according to the scale of the dolls. Shown are the nine possible distance units used. The stationary doll is shown in the central ring and is facing the subject, who is represented by the open circle at the bottom. The open side represents the child's front side.

Illustrated are 'in front' placements of the mobile doll at three different distances from the stationary doll -- 1.0 (within the first concentric ring), 4.0 (on the line between the second and third concetric rings), and 9.0 (within the fifth concentric ring).

Figure 1 about here

The stationary doll's head and body were, according to experimental condition, in one of three different alignments. In Figure 2, these are the rows beginning with numbers 1, 5, and 9. Each child's stationary doll was only one of these.

Figure 2 about here.

Each combination of head-body alignment of the stationary doll (1, 5, 9) was presented in four different orientations relative to the child -- with the body toward the child (nos. 1, 5, 9), 180 degrees away (nos. 2, 6, 10), turned to the child's right (nos. 3, 7, 11), and to the child's left (nos. 4, 8, 12). The set of four orientations was repeated three times for a total of 12 presentations. For each of these 12 presentations of the stationary doll, each child made three placements with the mobile doll -- in front, in back, and beside. Each set of three placements constituted a single trial.

For 48 children (24 boys, 24 girls), the head and body of both the mobile

and stationary dolls were in convergent alignment: for 48 children, the head and body were divergent for the stationary doll, and convergent for the mobile doll; and for the remaining 48 children, the head and body were convergent for the stationary doll, and divergent for the mobile doll.

Social relationships

We manipulated the social relationships between the dolls as follows: first, in a 'neutral', or control, condition, the child was simply shown the dolls and instructed to make his placements. In the 'friendly' condition, which we will call the 'like' condition, we said, "Let's pretend that Tom and Sue are very good friends and that they really like each other. Tom thinks that Sue is really nice, and Sue thinks that Tom is really nice too."

In the 'dislike' condition, we said, "Let's pretend that Tom and Sue aren't good friends. They don't like each other at all. Tom thinks that Sue is really mean, and Sue thinks that Tom is really mean too."

The control condition always came first, followed by the 'like' condition and then the 'dislike' condition for half the boys and girls, and by the 'dislike' condition and then the 'like' condition for the remaining children.

RESULTS

Let us start with the physical distance scores, since physical distance has been the usual measure in studies of personal space.

The distance scores were analyzed in a mixed-design analysis of variance, with the following between-subject variables: sex of subject, alignment combination of the dolls, sex combination of the dolls (here we presented to each child either two male dolls, two female dolls, or a mixed pair), and story order; and the

following within-subject variables: story type, orientation of body of the stationary doll, and type of placement -- front, back, and beside.

The results indicated closest mean distance when the dolls liked each other ($\bar{X}$ = 1.76, S.D. = 1.47), and farthest when they disliked each other ($\bar{X}$ = 3.99, S.D. = 1.32), and between these values in the neutral, control condition ($\bar{X}$ = 2.16, S.D. = 1.99). These differences were all significantly different from each other. We therefore could conclude that our procedure is as effective as other procedures in demonstrating the effect of social relationships on personal space as reflected in physical distance.

In addition to this main effect, there were 16 significant interactions, of which 15 consisted of interactions of between-subject variables with story type. But in nearly every interaction, mean distance for the 'like' condition was closer than for the control condition, and mean distance for the 'dislike' condition was farther than for the control, and <u>every</u> mean distance for the 'like' condition was closer than for the 'dislike' condition. The interactions thus amounted to variations in absolute distances within the basic pattern.

We subsequently did 'difference score' analyses using the distance scores on the control trials as baselines against which to assess these higher-order interaction effects. Nearly all these interactions disappeared with this analysis, indicating that they were the result of initial and usually small but reliable differences among small groups of subjects on the control trials.

Another significant main effect was placement type (F = 11.57, df = 2/3360, $p < .0005$). The 'in front' placements were farthest ($\bar{X}$ = 2.76), the 'in back' placements were intermediate ($\bar{X}$ = 2.66), and the 'beside' placements were closest ($\bar{X}$ = 2.49). These means were all significantly different from one another by Neuman-Keuls tests. Placement type did not interact with story condition or with any other variable. In other words, the average 'in front' placements were farther

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and the 'beside' placements were closest, in the control, 'like', and 'dislike' trials. This was an effect which did not disappear with the difference-score analysis, but in fact was accentuated in the comparison of 'control' trials with 'like' trials. The 'in front' distances decreased relative to their values in the control condition more than did the 'in back' and 'beside' distances relative to their values in the control condition. However, even though the 'in front' distances decreased relatively more, they still remained absolutely farther away than did the 'in back' or 'beside' distances.

If we consider just the scores for the 'front' and 'back' placements, their 'non-equivalent' expression in distance may seem perplexing at first blush. After an 'in front' placement, the mobile object is in front of the stationary object, and the stationary object is in back of the mobile object. And after an 'in back' placement, the same situation of relation holds, except that now it is the stationary object that is in front, the mobile object that is in back.

But our results indicate that these are not really equivalent situations. Front is not simply the reciprocal of back, and back is not simply the reciprocal of front -- at least with respect to the dimension of physical distance.

It seems, rather, to make a difference whether the object's ultimate spatial position was actively or passively defined. In a real-life situation, if you go and stand in front of someone else, would you therefore be liklier to stand farther away than if you stand behind him, even though he is now standing in front of you? Do our results therefore suggest that children's personal space boundaries for the spatial relation 'in front' are farther than for the spatial relation 'in back'? And why should this be so? Perhaps because the 'front' part of space is the working and social interactional part, and the boundaries reflect this feature.

The 'beside' placements, like the 'in back' placements, do not have this same

social implication. People can sit side by side and be nearly touching; the same close distance front-to-back or front-to-front would more obviously encroach on personal space. Our children seem to be reflecting this feature in their placements.

This is one of the pieces of evidence that suggests to us that 'front' is cognitively the most differentiated of the spatial terms, and has different linguistic properties.

Sex differences

Some of you are probably wondering about differences between boys and girls. We did find evidence of sex differences, not as a main effect ($F < 1.0$) but in complex interactions with other experimental variables such as the sex combination of the dolls. These sex differences do not appear to follow any consistent pattern or lend themselves to ready explanation. Quite frankly, we are not sure yet just what to make of them. In nearly all instances, though, the main effect of story condition and placement type are maintained in these interactions. Absolute values differ somewhat, but 'like' placements are always closest, and 'dislike' placements farthest; and similarly, 'in front' placements are always farther and 'beside' placements closest.

Individual differences

These summary statistics, though showing clear, significant differences in distance scores as a function of story condition, nevertheless do not give much indication of the range of type of responses for individual children. We graphed the average scores in each story condition for each of the 144 children. These graphs very clearly show a wide variety of responses to the task.

We have categorized each child's 'profile' according to several criteria, examples of which are illustrated in figure 3. We basically have four categories,

Fig. 3 here

within which are variations representing changes in magnitude. Category 1 are those children (19 boys and 21 girls) who showed little or no change in distance across the control, like, and dislike trials. Nearly all these children placed the mobile doll very close to the stationary doll -- as the illustrations show.

In category 2, with five variations, are 38 children who made their control and 'like' placements at the same distance, and whose 'dislike' placements were farther away, how far away being the dimension of variation. In most cases, these children could not get their 'like' distance closer than their control distances because their control distances were too close to begin with.

In category 3 we have the pattern that best matches the over-all results for the study, with 'like' placements closest, and 'dislike' placements farthest. The three variations of this pattern account for 33 children.

Finally, in category 4 are 33 children who, in one way or another, show reversals in the over-all pattern. In most cases, the reversals are minor -- the 'like' distances are slightly farther than the control distances, but both are closer than 'dislike' distances.

We will be referring back to these different patterns of variation later, as we take up the question of the kinds of placements made. We will be particularly interested in comparing those children whose distances did not change and who presumably were not using physical distance to express the relationship between the dolls with those children whose distances did change.

We turn then to the second dependent variable in the study.

Placement Patterns

Let us now consider the placements themselves. The results, like those of our previous study, showed that placements were based primarily on the bodies of the dolls. Therefore, we used categories of patterns defined by the dolls' bodies which had appeared in our previous study. Three patterns -- which we call "regular" --

are illustrated in Figure 4. Note that the location of the mobile doll is the same in all patterns. The patterns differ only in the orientation of the mobile

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Fig. 4 here

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doll. In Pattern W, the body of the mobile doll is turned toward the stationary doll for the 'front' and 'back' placements, but is the same as the orientation of the body of the stationary doll for the 'beside' placement.

In Pattern X, the body of the mobile doll is turned toward the stationary doll in all instances.

In Pattern Z, the bodies of the mobile doll and stationary doll face in the same direction in all instances.

Table 1 shows the per cent frequency of occurrence of each of these placement patterns together with their distribution of use by boys and girls in the three story conditions. The far-right column gives the per cent frequency of each pattern across the three story conditions. (In general, the over-all frequencies are comparable to those found in our previous study.) Pattern Z -- the most symmetrical -- was by far predominant, accounting for 55% of the total.

We have previously speculated that this predominant use of Pattern Z reflects the frequency with which children see things lined up, or their preference for symmetrical arrangements. Patterns W and X also seem to reflect frequently occurring orientations of bodies, but in contrast with Pattern Z, the 'front' placements might instead represent orientations for social interaction. For most kinds of social interaction, people stand with their bodies turned toward each other rather than front to back. The first question we asked was whether the use of these possibly social-interactive patterns changed across the story conditions.

But from Table 1, it appears that any changes were minor. And when we looked

at individual children's responses, most children consistently used the same pattern across trials.

The incidence of use of irregular patterns -- patterns which differed from W,X, or Z -- did not change markedly either (see Table 1), but here we had prior evidence that the use of face cues often was the basis for these patterns, so we looked to see whether those irregular patterns reflecting the use of face cues as bases for placements in turn reflected the changing social relationship between the dolls.

Irregular patterns

To do this, we judged each irregular pattern for whether the use of face cues as a basis for placement was clearly present, probably present, possibly present, or clearly absent.

The top section of Figure 5 illutstrates two irregular patterns in which the placement on the basis of the face cue was judged to be clear. On the left, the mobile doll is always looking at the stationary doll; on the right the mobile doll is always looking away. Of the 414 irregular patterns, face cues were judged

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Fig. 5. here
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to be clearly present in sixty-five per cent (= 268 patterns), and judged to be clearly absent in five per cent.

Did the use of the face cue in these irregular patterns change according to story condition? Table 2 shows the distribution of the 65 per cent of irregular patterns judged to be clearly based on face cues. Face use increased from control

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Table 2 here
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to 'like' to 'dislike', with the sharpest increase from 'like' to 'dislike'. It

seems, then, that the 'dislike' condition elicits more clear use of face cues than does either the 'control' or 'like' condition, which are more similar to each other.

We also tallied whether the dolls were looking toward or away from each other in these irregular patterns. In the control condition, the dolls faced each other in 65 of the 67 patterns. In the 'like' condition, the dolls faced each other in 82 of the 83 patterns. But in the 'dislike' condition, the dolls faced away from each other in 94 of the 117 patterns. Thus the effects of story condition were clear and strong.

'Beside' shifts

Since only a minority of the children made a substantial number of these irregular patterns, we wanted a measure that would be applicable to more of the subjects in the study. In our previous study, when one doll's head and body were in divergent alignment, it was on the beside placements on all types of patterns that use of the face as a spatial cue and also as a social cue was most apparent.

If you look again at Figure 2, note that variations 5 & 6 and 9 & 10, and variations 7 & 8 and 11 & 12 constitute sets of trials on which the body orientation of the stationary doll changes so that the face is now turned in the opposite directions relative to the child. On these sets of trials, a child using face cues should shift the location of his 'beside' placements.

In Figure 6, an example based on the pair 5 & 6 is shown. The top two sections

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Fig. 6 here

(Rows 1 and 2) illustrates the use of the face cue -- to maintain face contact (Row 1), or to avoid face contact (Row 2). In both instances, as the orientation

of the head of the stationary doll changes relative to the child, the child shifts the location of his 'beside' placement.

In Row 3, which illustrates the absence of use of the face cue, the location of the mobile doll remains constant regardless of changes in orientation of the head of the stationary doll.

Table 3 summarizes the frequencies of these 'beside' shifts, the number of individual children shifting at least once, and the direction of shift. The children of interest are those 96 children for whom one doll's head and body were in divergent alignment. Shifts on the control trials are shown for comparison purposes.

Table 3 here

On the 'like' trials, the great majority of shifts maintained face contact. On the 'dislike' trials, the great majority of shifts avoided face contact.

So the evidence from use of face cues both for the entire 'irregular' patterns and for the 'beside' shifts for all patterns agrees with the physical distance scores in suggesting that the control condition is functionally very close to the 'like' condition. Apparently, in the absence of a specified relationship between the dolls, children treat the dolls as though they were friends. And obviously, the nearly exclusive occurrence of face-away patterns in the 'dislike' condition is consistent with the use of greater physical distance in the 'dislike' condition.

Relation between distance scores and placement patterns

So our over-all analyses show that both distance scores and placement patterns respond to the experimental variable of story condition. Social distance in children therefore can -- and should-- be defined both in terms of physical space and in

terms of behaviors such as eye contact or turning one's back.

But we have already mentioned substantial individual differences among children both in distance scores and in use of placement patterns. In individual children, were changes in one measure as a function of story condition paralleled by changes in the other dimension?

We answered this question by first dividing the 144 children into those who used Pattern Z -- the symmetrical patterns -- nine or more times and those who used Pattern Z fewer than nine times. We assumed that Pattern Z does not represent social interaction between the dolls. We're assuming, then, that children who did use social-interactive patterns (like Wand X) would be concentrated in the group using Pattern Z fewer than nine times.

Within these two groups, we then identified those children who made their placements about the same distance regardless of story condition (in Fig. 3, the children represented in Category 1) -- and those children who changed distance with story condition.

Substantially more children *showed* distance variation than did not, as Figure 3 shows. What our comparison disclosed is that about half the children in each distance group appeared in each pattern group. So we find no evidence that use of one dimension of social distance necessarily accompanies use of the other. Rather we find four distinguishable groups of children: about 18 per cent of the children use neither distance nor patterns to express social interaction; about 18 per cent use only placement patterns; about 31 per cent use only distance variations; and about 33 per cent express social relationships through both distance and pattern use.

We pursued this question further by asking whether children in each of these four different groups had differed in the frequency with which they used beside shift. Recall that if one of a child's dolls was in divergent head-body

alignment, he could respond to face cues by shifting his 'beside' placement and that these shifts changed with story condition. We compared mean frequencies of beside shifts for children who had one doll in divergent alignment within each of the four social expressiveness groups. The children who had used both distance and patterns to express social relationships also made significantly more beside shifts ($t = 2.12$, $df = 58$, $p < .05$) than did children in any of the other three groups.

So our over-all significant effects of story condition on distance scores and placement patterns cannot be interpreted to mean that every child, or even the majority of children, is using both dimensions of social distance simultaneously in his placements.

The difference between 'in front', 'in back', and 'beside'

So far we've spoken of patterns of placements, that is, of combinations of 'in front', 'in back', and 'beside' placements, and of the relationship between patterns and physical distance. But we also looked at each spatial term by itself. We did this because among all the different patterns we have discovered, it is the 'front' placements that appear to change the most. Recall that the difference between our two social-interactive patterns, W and X, and the third major pattern, Z, is the orientation of the 'front' placement. The 'back' placements are identical. Would 'in front' placements therefore better reflect the differences among the story conditions?

To find out, we asked whether one kind of placement changed more (whether in orientation, location, or both) than the others across the 'control', 'like', and 'dislike' trials. We compared each subject's four 'in front' placements in the control condition with his four 'in front' placements in the 'like' condition, matching pairs of trials in which orientation of the stationary doll was the same. The control and 'dislike' and also 'like' and 'dislike' trials were

compared in the same way. Having done this for 'in front', we then did the same thing for the 'in back' and 'beside' placements.

The results of this tally are summarized in Table 4.

Table 4 here

For the boys, the 'in front' placements show the greatest frequency of change except for the contrast between control and 'dislike' where the differences are negligible. For the girls, in every case the 'in front' placements show the most frequent change. 'Back' and 'beside' tend to be more similar than either is to 'in front', though the tally also suggests that 'in back' may change more frequently than 'beside'.

We believe that these differences suggest that 'in front' -- as a spatial-linguistic term -- may have somewhat different properties from 'in back'. The 'in front' - 'in back' difference therefore might be encompassable within the kind of linguistic framework recently discussed by Clark (1970) and by Gary Olson in their analysis of the linguistic properites of comparative terms.

Clark suggests that many of the spatial adjectives in English occur in pairs of which one member is called, in traditional linguistic terminology, "marked" and the other is called "unmarked". Examples of such pairs are deep-shallow, long-short, and near-far. Both members of such pairs may be used in a contrastive sense, referring to comparisons along a dimension: one object can be longer or shorter, deeper or shallower, nearer or farther, than another. However, the 'unmarked' terms but not the 'marked' terms can also be used in a nominal sense. They name a dimension, with no comparison implied. So we can say, this object is ten feet long, or ten feet deep; but it is ungrammatical to say, this object is ten feet short, or ten feet shallow.

Front and back do not clearly specify a dimension along which contrasts

can be made, as adjective pairs such as near-far or long-short do. Yet in other ways, they do appear to demonstrate many of the properties shown by other unmarked-marked pairs, with 'front' the unmarked term and 'back' the marked term.

For instance, one attribute of the unmarked term is that it shows greater differentiation. Our findings summarized earlier suggest that 'front' is more differentiated than 'back'.

Another attribute imputed to the unmarked term is its positive 'valence'. 'Long' and 'deep' are positive; 'short' and 'shallow' are negative. 'Front' and 'back' appear to have this same polarity. Think of the many expressions employing the word 'front' that convey the sense of importance for things that are in front: news makes the 'front pages'; the good student goes to the 'front of the class', and one aspires to be in the 'front ranks' of one's profession. The negative valence on 'back' is very clear: we speak of 'backwards' countries, 'backwards' peoples, to take a 'back seat', to 'backbite', to go 'back on our word', and to 'backslide'

Why should 'front' have these linguistic characteristics? Our knowing that something is 'in front' of something else presupposes that the 'something else' has a front, or that a front has been attributed to it. The terms 'in front' and 'in back' (and 'beside') as terms specifying spatial relations among objects therefore are differentiated out of terms specifying planes of the child's own body. 'Front' must be learned as an absolute property of the child's own body before he will be able to use the same term relationally. 'Front' is the unmarked, more differentiated side because the front is the side of action in the world; it is the side on which the eyes are located, and from which the arms and hands more naturally extend, the direction in which the child moves, and the side of social interaction. The baby's first visually directed movements are toward objects in front of him, and the first object he draws to himself are drawn to his front side.

We recognize these ideas as in the spirit of the kind of organismic-dynamic analysis pioneered by Heinz Werner and Seymour Wapner. According to them, the most important clue to the source of the major systems of spatial frame-of-reference in the body itself. 'Objective space' evolves from this 'primitive' (in the sense of fundamental) orientation, in all of its interrelated attributes -- the perceptual-spatial, the social, and the linguistic.

Figure 1. Scale for scoring placement distances.

Shown is a schematic representation of the stationary doll in the center ring and the mobile doll at three different distances from the stationary doll. The open sides of the representations indicate the front of the body and the face, so the mobile doll is facing the stationary doll.

The concentric rings represent equal divisions of the circular board upon which placements were made. The distance equivalent of each score in inches is shown, as is the distance equivalent adjusted to the scale of average adult height (real-life inches).

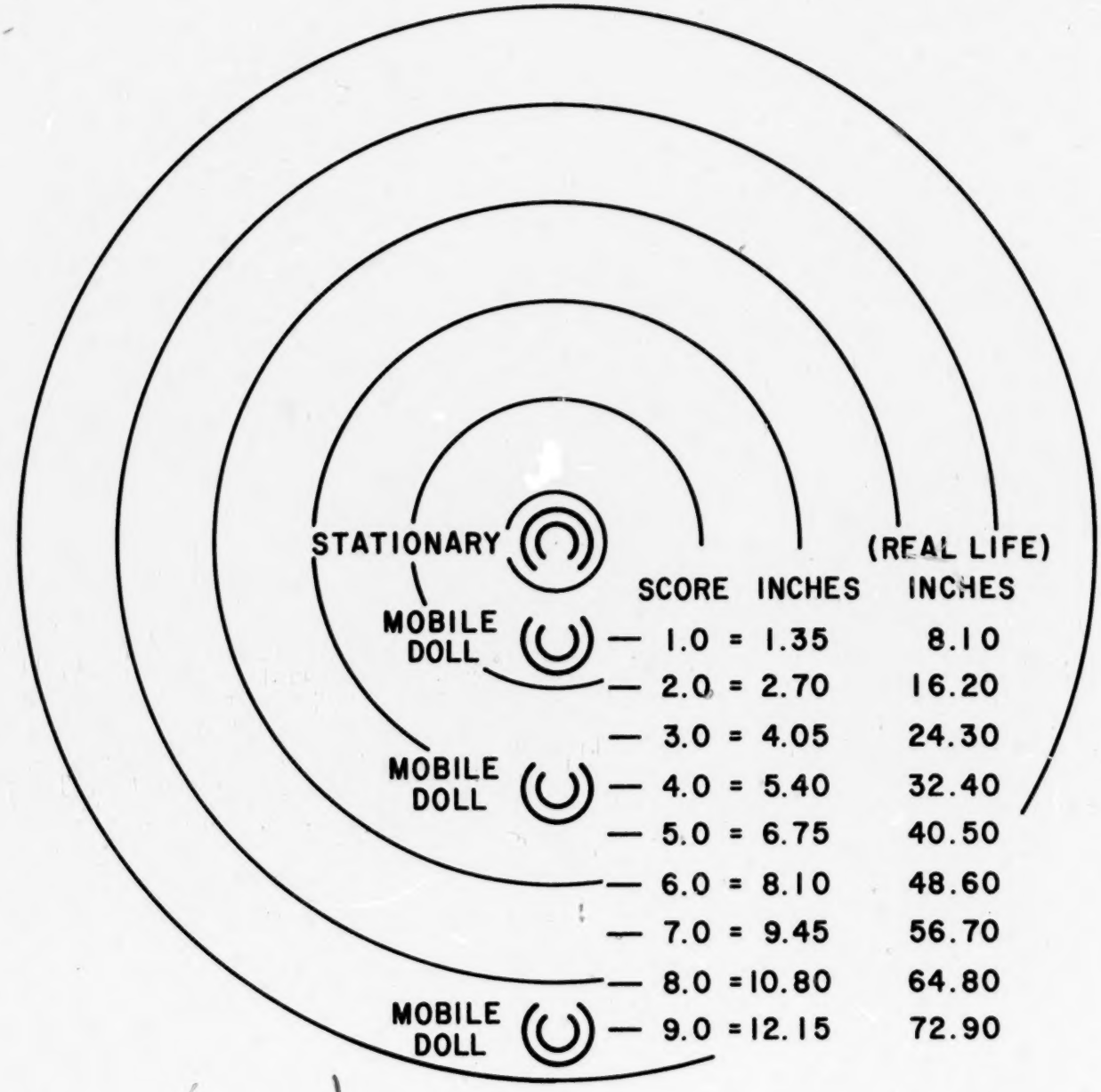
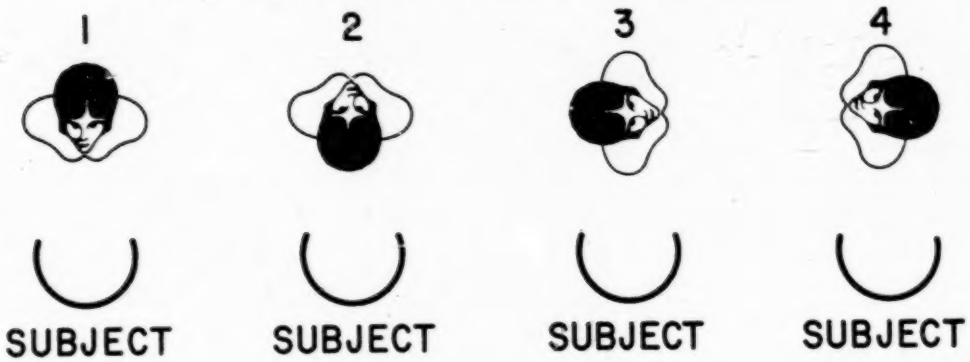

STATIONARY
MOBILE DOLL
MOBILE DOLL
MOBILE DOLL
SCORE INCHES (REAL LIFE) INCHES
— 1.0 = 1.35 8.10
— 2.0 = 2.70 16.20
— 3.0 = 4.05 24.30
— 4.0 = 5.40 32.40
— 5.0 = 6.75 40.50
— 6.0 = 8.10 48.60
— 7.0 = 9.45 56.70
— 8.0 = 10.80 64.80
— 9.0 = 12.15 72.90

Figure 2. Illustration of head-body alignments and body orientations of the stationary doll relative to the subject.

The subject is represented by the open circle, with the open side the subject's front side.

Each combination of head-body alignment of the stationary doll (row beginning 1, 5, and 9) was presented in four different orientations relative to the child -- with the body toward the child (nos. 1, 5, and 9), 180 degrees away (nos. 2, 6, 10), turned to the child's right (nos. 3, 7, 11), and to the child's left (nos. 4, 8, 12).

HEAD AND BODY CONVERGENT



HEAD AND BODY DIVERGENT

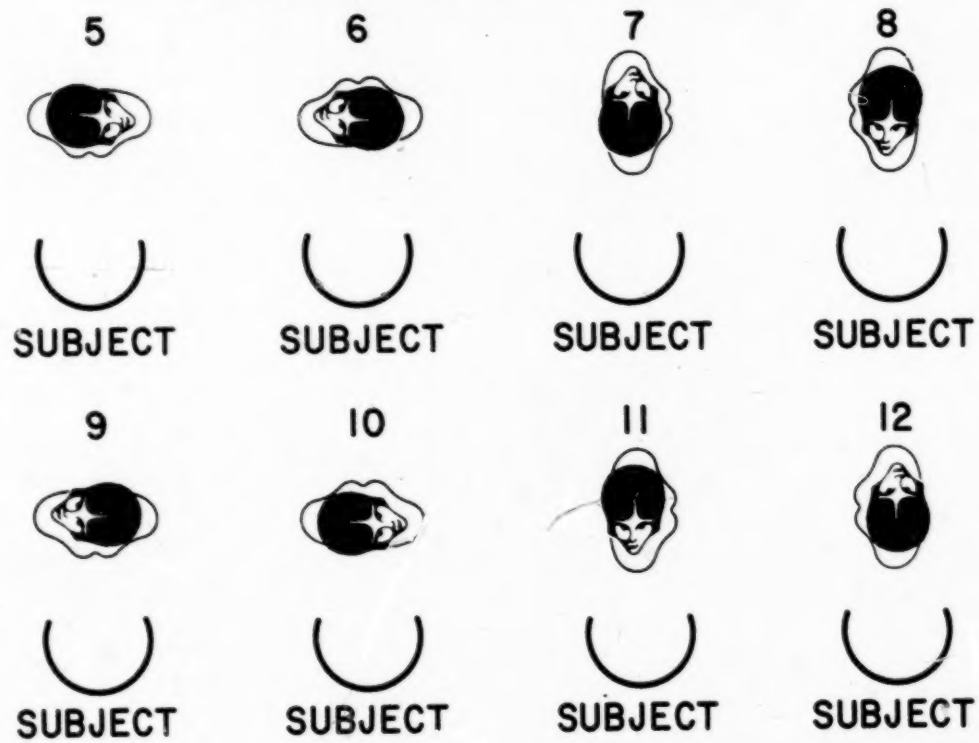
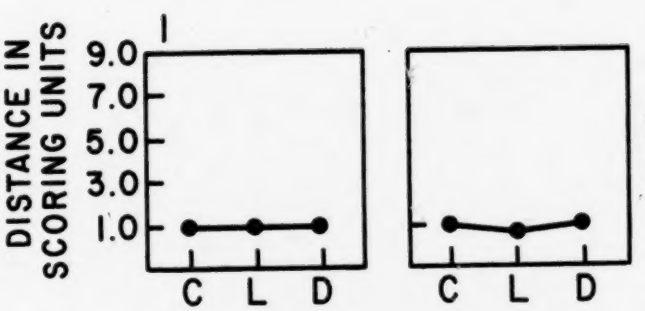
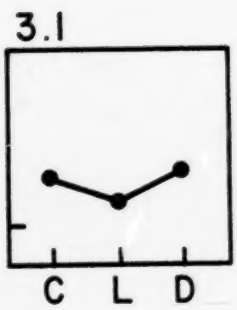


Figure 3. Illustrations of all the different ways that distance scores changed across story conditions, and the number of children whose average distance scores are approximated by each illustration.

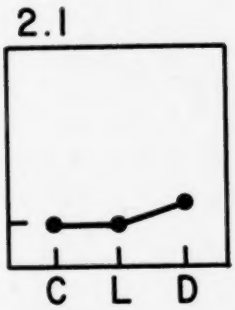
C – control
L – like
D – dislike



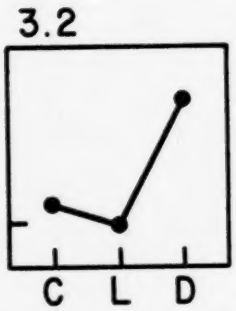
BOYS: 19
GIRLS: 21



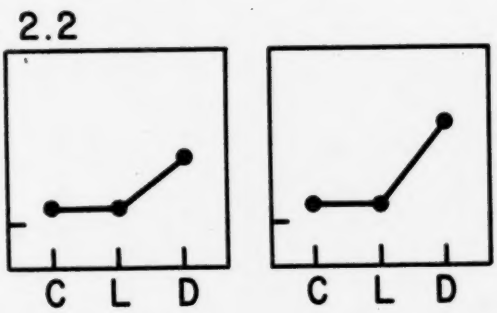
BOYS: 7
GIRLS: 4



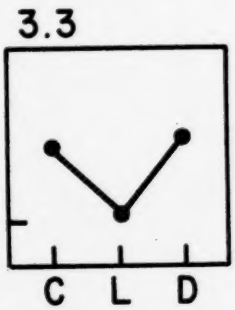
BOYS: 2
GIRLS: 4



BOYS: 7
GIRLS: 6

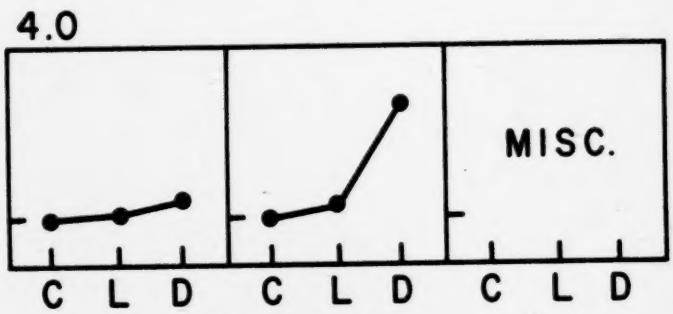


BOYS: 10
GIRLS: 9



BOYS: 5
GIRLS: 4

BOYS: 4
GIRLS: 9



BOYS: 18
GIRLS: 15

Figure 4. The three placement patterns scored as 'regular' (body rather than face as basis for placement).

The doll marked "ST" is the stationary doll. 'F', 'B', and 'S' represent the 'in front', 'in back', and '[be]side' placements of the mobile doll in relation to the stationary doll.

Both dolls, in each pattern, are represented with head and body in convergent alignment. The same patterns appeared regardless of alignment combination.

The drawings depict the stationary doll and subject facing in the same direction. The same placement patterns appeared when the stationary doll was turned to either side or toward the subject (as illustrated in Figure 2).

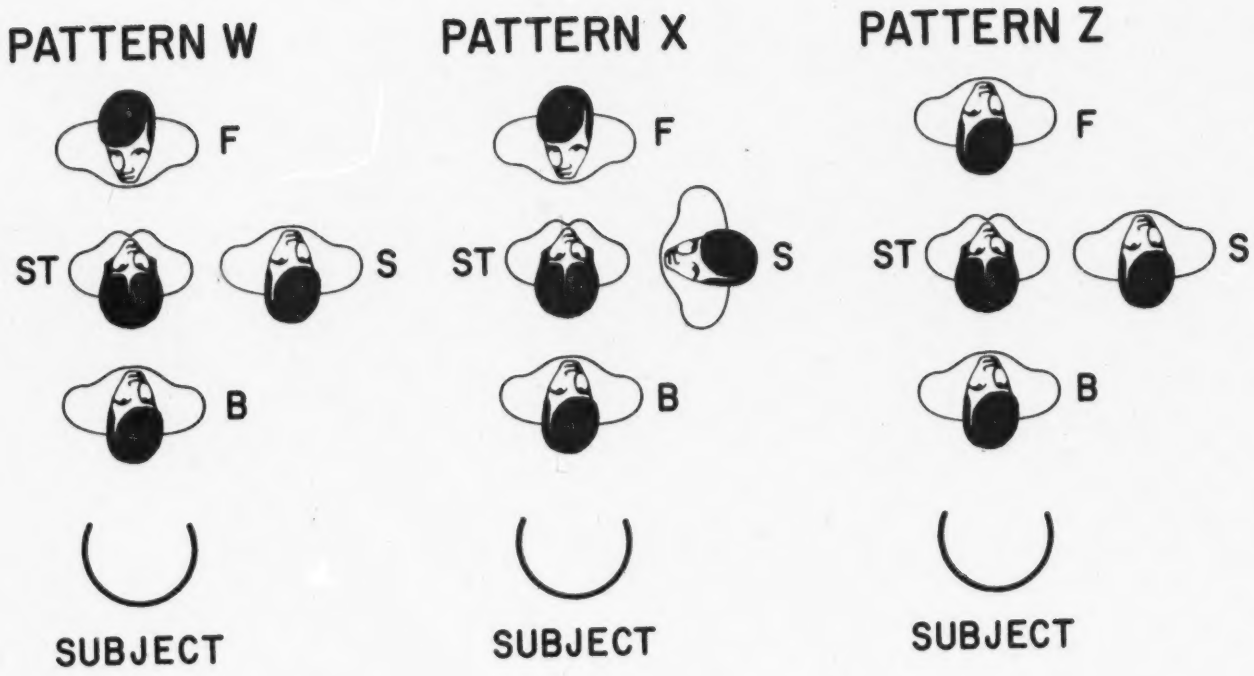

PATTERN W
F
ST
S
B
SUBJECT
PATTERN X
F
ST
S
B
SUBJECT
PATTERN Z
F
ST
S
B
SUBJECT

Table 1. Percent distribution of placement patterns by story condition and sex of subject.

Story cond.	Control		Like		Dislike		Totals		
Sex of S	boys	girls	boys	girls	boys	girls	Σboys	Σgirls	
Pattern									
W	19.8%	16.3	17.4	12.8	13.2	10.4	16.5	13.2	15.0
X	5.6	2.4	11.4	4.5	4.9	3.8	7.3	3.6	5.4
Z	55.2	58.0	49.6	59.3	47.9	61.8	51.0	59.9	55.3
Irregular	19.4	23.2	21.5	23.2	34.0	23.9	25.1	23.6	24.2

Figure 5. Examples of three 'irregular' patterns in which face cues clearly are basis for placements.

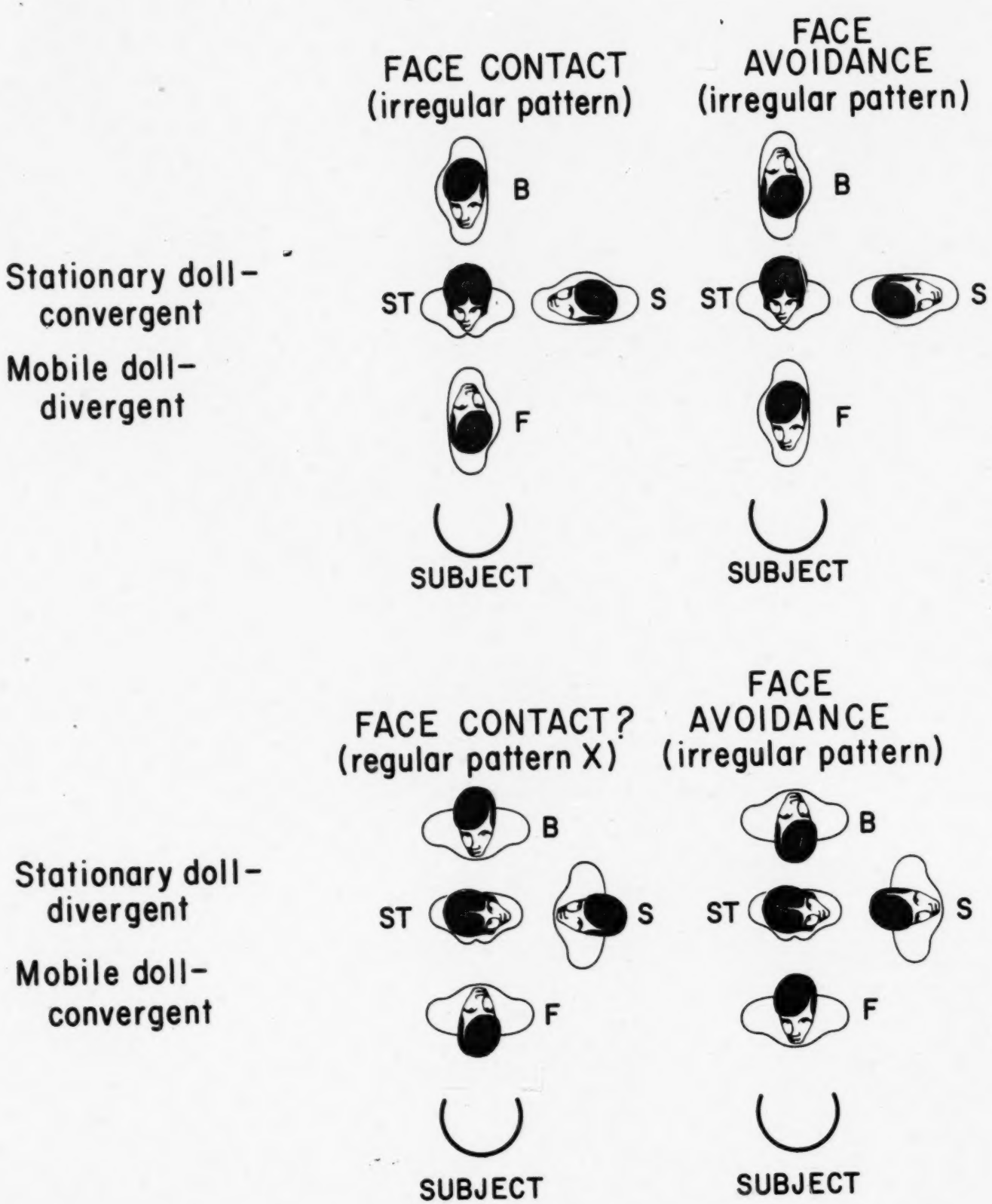

FACE CONTACT
(irregular pattern)
FACE
AVOIDANCE
(irregular pattern)
Stationary doll–
convergent
Mobile doll–
divergent
B
ST
S
F
SUBJECT
FACE CONTACT?
(regular pattern X)
FACE
AVOIDANCE
(irregular pattern)
Stationary doll–
divergent
Mobile doll–
convergent

Table 2. Distribution over story condition and sex of subject of those irregular patterns of 'front', 'back', and 'beside' placements clearly showing use of face cues.

Direction of face contact	Story Condition		
	Control	Like	Dislike
Girls			
Looking toward	30	32	3
Looking away	0	0	40
Boys			
Looking toward	33	50	20
Looking away	2	1	54
Total			
Looking toward	63	82	23
Looking away	2	1	94

Figure 6. Use of face cue as illustrated by 'beside' ('S') placements. Each set of placements shown would have been made by the same subject; judgment of use of face cue depends on comparing the placements within each set.

In the examples shown, the stationary doll is looking to her left; the mobile doll is looking straight ahead.

Where sets of placements are judged to reflect the use of face cues, the location of the mobile doll shifts from side to side, either to maintain face contact (top row), or to avoid face contact (middle row). Where the location of the mobile doll does not shift (bottom row) is judged to reflect the absence of use of face cue.

MAINTAINING FACE CONTACT

SUBJECT

SUBJECT

AVOIDING FACE CONTACT

SUBJECT

SUBJECT

ABSENCE of USE of FACE CUE

SUBJECT

SUBJECT

Table 3. Total frequencies of location shifts on 'beside' placements, and number of individual children making such shifts.

Combination of alignments of head & body of dolls	Story Condition: Control				Like				Dislike			
	Boys		Girls		Boys		Girls		Boys		Girls	
	Freq.	(N)	Freq.	(N)	Freq.	(N)	Freq	(N)	Freq.	(N)	Freq.	(N)
Both dolls convergent (24 boys, 24 girls	10	(9)	8	(8)	7	(7)	7	(7)	5	(5)	8	(8)
One doll divergent (48 boys, 48 girls)												
maintain face contact	30	(22)	30	(22)	49	(31)	30	(23)	10	(7)	6	(6)
avoid face contact	11	(10)	6	(6)	3	(3)	2	(2)	33	(20)	30	(20)

Table 4. Comparisons of number of changes in 'in front', in 'beh 'in back', and 'beside' placements between pairs of story conditions.

Sex of child	Placement type	Story Conditions Compared: Control-Like Freq.	Control-Like Rank	Control-Dislike Freq.	Control-Dislike Rank	Like-Dislike Freq.	Like-Dislike Rank
Boys							
	Front	62	(1)	67	(3)	88	(1)
	Back	34	(3)	70	(1)	72	(2)
	Side	54	(2)	68	(2)	66	(3)
Girls							
	Front	64	(1)	83	(1)	67	(1)
	Back	39	(2)	56	(2)	58	(2)
	Side	37	(3)	46	(3)	45	(3)

Table 4. Comparisons of number of changes in 'in front', in 'acb 'in back', and 'beside' placements between pairs of story conditions.

Sex of child	Placement type	Story Conditions Compared: Control-Like Freq.	Control-Like Rank	Control-Dislike Freq.	Control-Dislike Rank	Like-Dislike Freq.	Like-Dislike Rank
Boys							
	Front	62	(1)	67	(3)	88	(1)
	Back	34	(3)	70	(1)	72	(2)
	Side	54	(2)	68	(2)	66	(3)
Girls							
	Front	64	(1)	83	(1)	67	(1)
	Back	39	(2)	56	(2)	58	(2)
	Side	37	(3)	46	(3)	45	(3)